Environment Canada
Environnement Canada

Environmental Conservation Service
Service de la Conservation de l'environnement

Inland Waters Directorate
Western and Northern Region

Direction générale des eaux intérieures
Région de l'Ouest et du Nord

Report

to

The 1987 Athabasca-Mackenzie Waterways Workshop

on

The 1986 Mackenzie River Water Level Monitoring and Forecasting

Prepared by:

Chris Heron
Data Control Supervisor
Water Resources Branch
NWT Programs
Yellowknife, NWT

January 1987

WESTERN AND NORTHERN REGION
INLAND WATERS AND LANDS
CONSERVATION AND PROTECTION
ENVIRONMENT CANADA

Report

to

The 1987 Athabasca-Mackenzie Waterways Workshop

on

The 1986 Mackenzie River Water Level Monitoring and Forecasting

Prepared by:

Chris Heron
Data Control Supervisor
Water Resources Branch
NWT Programs
Yellowknife, NWT

NWT-IWL-WRB-0001

WANG 0104R

January 1987

Report to the 1986 Athabasca-Mackenzie Waterways Workshop

Preface

Environment Canada through its Water Survey of Canada offices provided water level monitoring, report and forecasting along the Mackenzie River Navigational System for 1986. This program is conducted by the Yellowknife office of Water Survey and is jointly funded with the Ministry of Tranport.

Pre-Season Plans and Attendant Results

The annual pre-season workshop, hosted by the Canadian Coast Guard, Hay River was held on May 21, 1986. Topics of discussion and subsequent results were:

1. The water supply outlook for 1986 was not expected to be as high as for 1985. Snow survey results from the Upper Peace and Liard Rivers indicated water content at 93% of normal. Flows for the Slave River and elevation of Great Slave Lake were both at historical levels.

   A. Great Slave Lake water levels were average in May but remained above normal for the remainder of the navigation season.

   B. Subsequent water levels for the Mackenzie River were above historical means for the 1986 navigation season.

2. Six data collection platforms (DCPs) providing satellite telemetry of real-time data are scheduled for installation in 1986. These data will be used to refine the forecasts between key sites on the Mackenzie River.

   A. DCPs were installed on the Carcajou, Mountain, Redstone, Johnny Hoe, Great Bear and Liard Rivers. Complete coverage of monitored inflow within the forecast reach is now possible.

   B. Atmospheric Environment Service has offered their assistance in forecasting heavy precipitation events.

3. Mr. R.W. Sandilands, Regional Field Superintendent, Canadian Hydrographic Services from Sidney, B.C, outlined the contract to survey the Mackenzie River from km 0 to km 435 during 1986. He requested forecast information and other related data from our Yellowknife office.

   A. Mackenzie River forecast information was supplied to the contractor at weekly intervals during the navigation season.

   B. Station description and datum references were supplied as requested.

4. Operational schedules and equipment for the 1986 forecasts will not change appreciably from the 1985 format except to upgrade the system as noted in 2.A.

   A. The real-time forecast network for 1986 was as follows:

Great Slave Lake at Yellowknife Bay	Water Survey of Canada
Mackenzie River near Fort Providence	Data Collection Platform
Mackenzie River at Fort Simpson	Telemark
Liard River at Fort Liard	Paid Observer
South Nahanni River above Virginia Falls	Data Collection Platform
Root River near the Mouth	Data Collection Platform
Mackenzie River near Wrigley	Data Collection Platform
Mackenzie River at Norman Wells	Data Collection Platform
Mackenzie River at Sans Sault Rapids	Data Collection Platform
Mackenzie River at Fort Good Hope	Paid Observer

5. Tentative data for Great Slave Lake were to be supplied bi-monthly to the Coast Guard, Hay River.

6. Mr. H.R. Dubinsky, District Manager, Canadian Coast Guard, Hay River stated that he has noticed a great improvement in the water level reports and forecasts over the last two or three years.

   A. User satisfaction with the forecast data has been and will continue to be a prime concern of Environment Canada.

Water Level Forecasts 1986

The forecast commenced June 2, with forecasts being issued daily except for weekends, and concluded October 17, 1986. Ninety-five telex messages were sent to:

Air Radio	Hay River
Public Works Canada	Edmonton
NTCL	Hay River (forewarded to Edmonton)
Canadian Coast Guard	Hay River
Imperial Oil Ltd.	Norman Wells
Arctic Transport	Calgary
Arctic Transport	Tuktoyaktuk
Canadian Coast Guard	Inuvik
Air Radio	Fort Simpson
Air Radio	Norman Wells
Cooper's Barging	Fort Nelson

The 1986 forecasts provided reliable and useful water level information and user requirements were met.

   A. Accurate water levels during the first two weeks in June were difficult as the Mackenzie River system is in the process of breaking up and water levels tend to fluctuate greatly as the ice jams, and releases on the river.

B. The gauging station for Mackenzie River at Norman Wells as established on Island 2 in October 1985 was operational for the 1986 forecast season.

C. The Mackenzie River at Sans Sault Rapids did not come on-line until June 29. Residual ice from spring breakup was packed in along the shoreline and installation of recording equipment was impossible.

D. There were eight major water level peaks along the reach during 1986. Three peaks were attributed to snowmelt and runoff, and precipitation events generated the other five. The Liard River Ferry was shutdown July 5 due to extreme driftwood and high velocities.

E. Observer service was not available for Fort Liard levels during the period. June 24 to July 10 but forecast accuracy was not seriously effected.

Program for 1987

A continuing effort will be made to upgrade and maintain existing forecast stations particularly in the area of satellite telemetry of real-time data. Data Collection Platforms should be operational by early summer for most inflow streams to the Mackenzie River as far downstream as Fort Good Hope.

Appendices

1. Program Costs

2. Recorded and forecast stage hydrographs for all gauging stations used in the forecast.

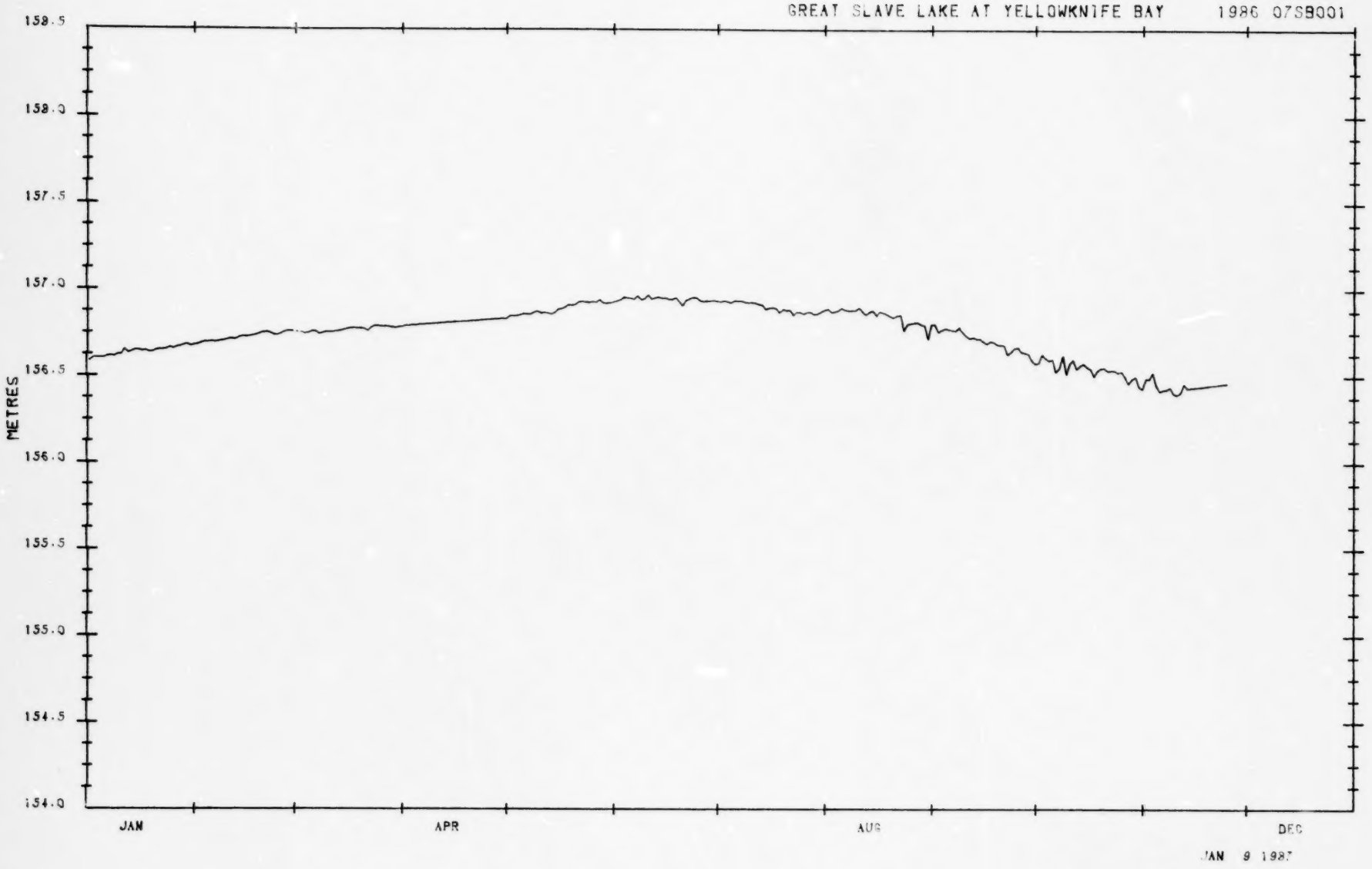
   Note: The forecast data is plotted in red for the following stations; Mackenzie River at Norman Wells, Sans Sault Rapids, and Fort Good Hope.

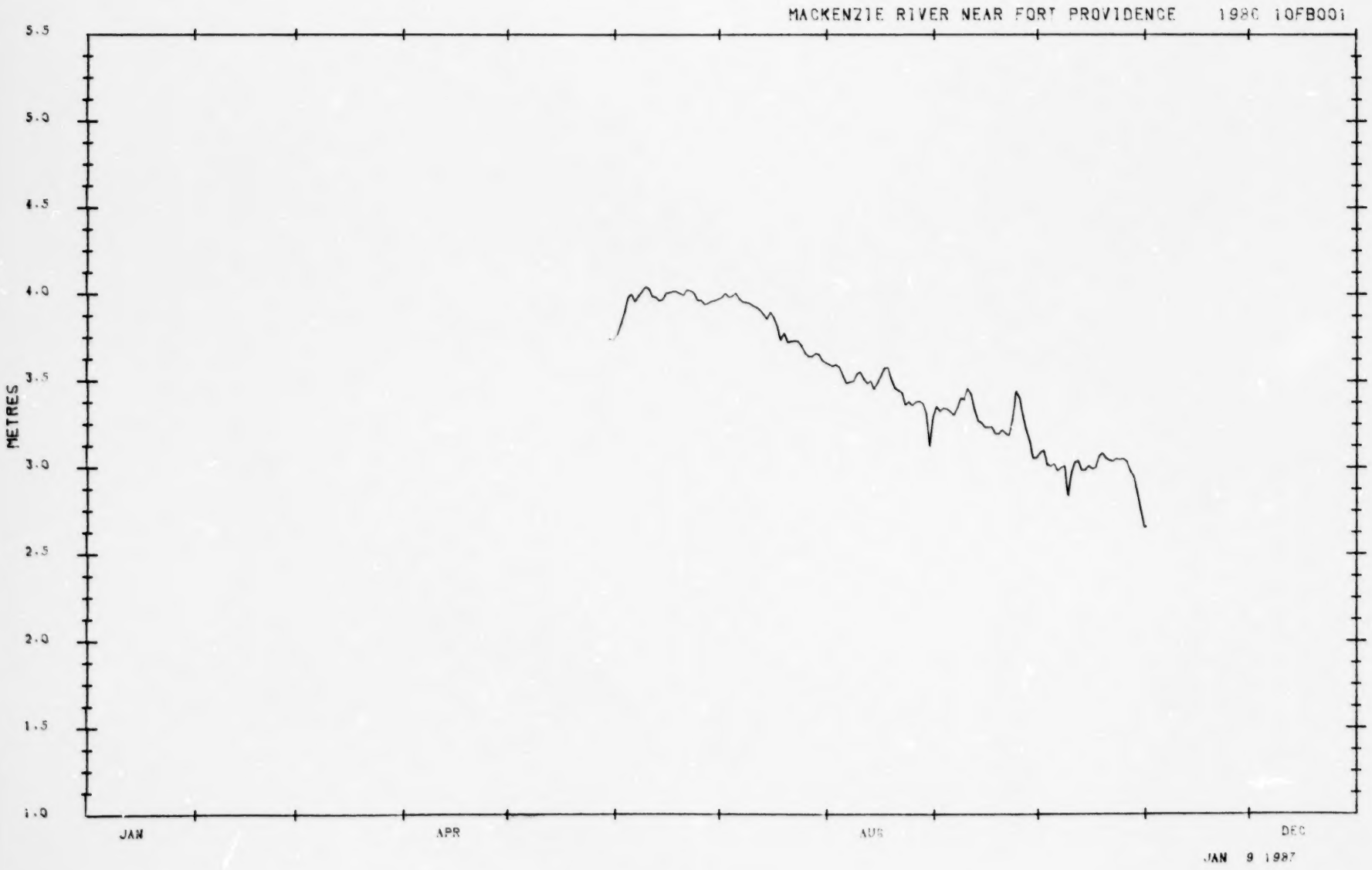
Mackenzie River Water Level Forecasts

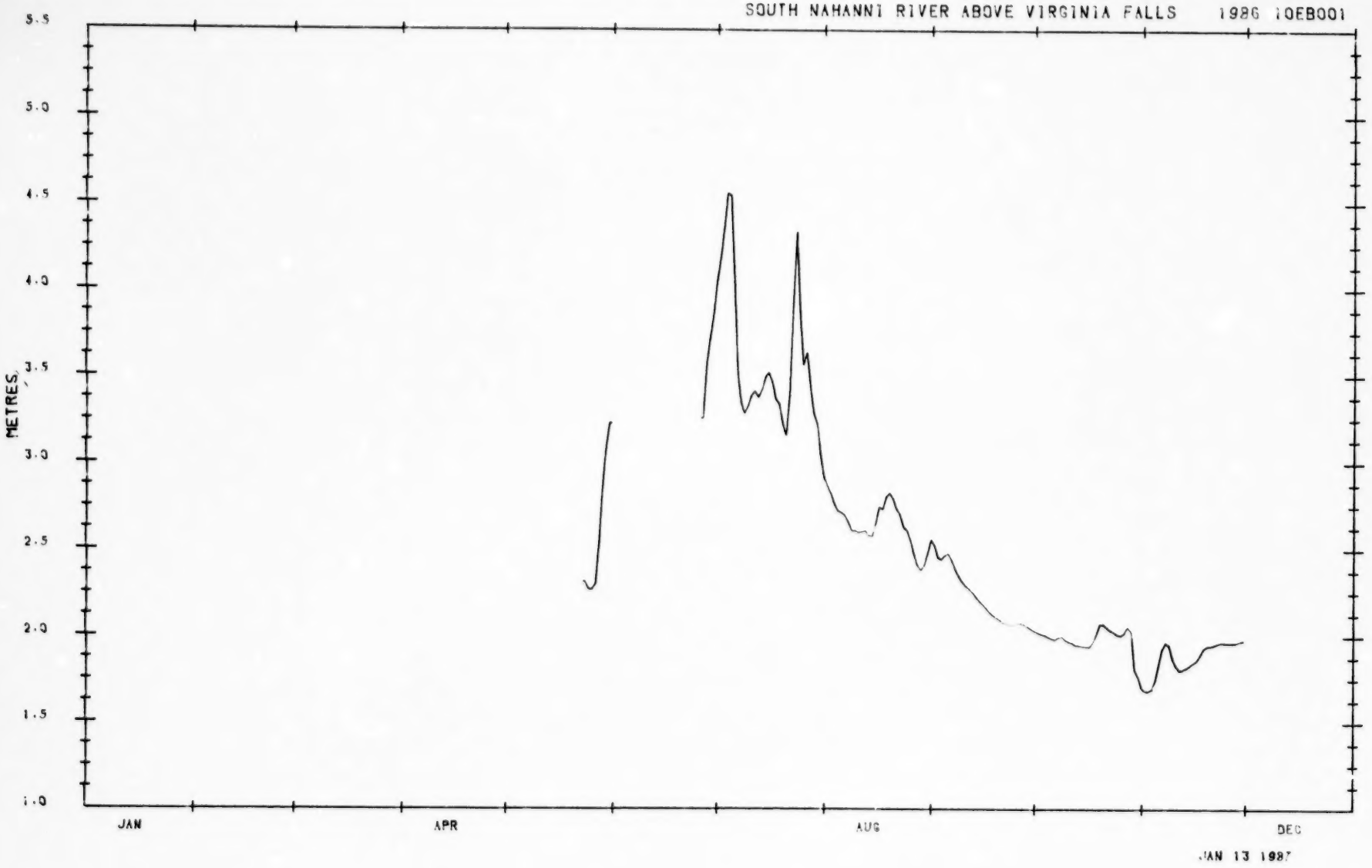
Operational Costs - 1986

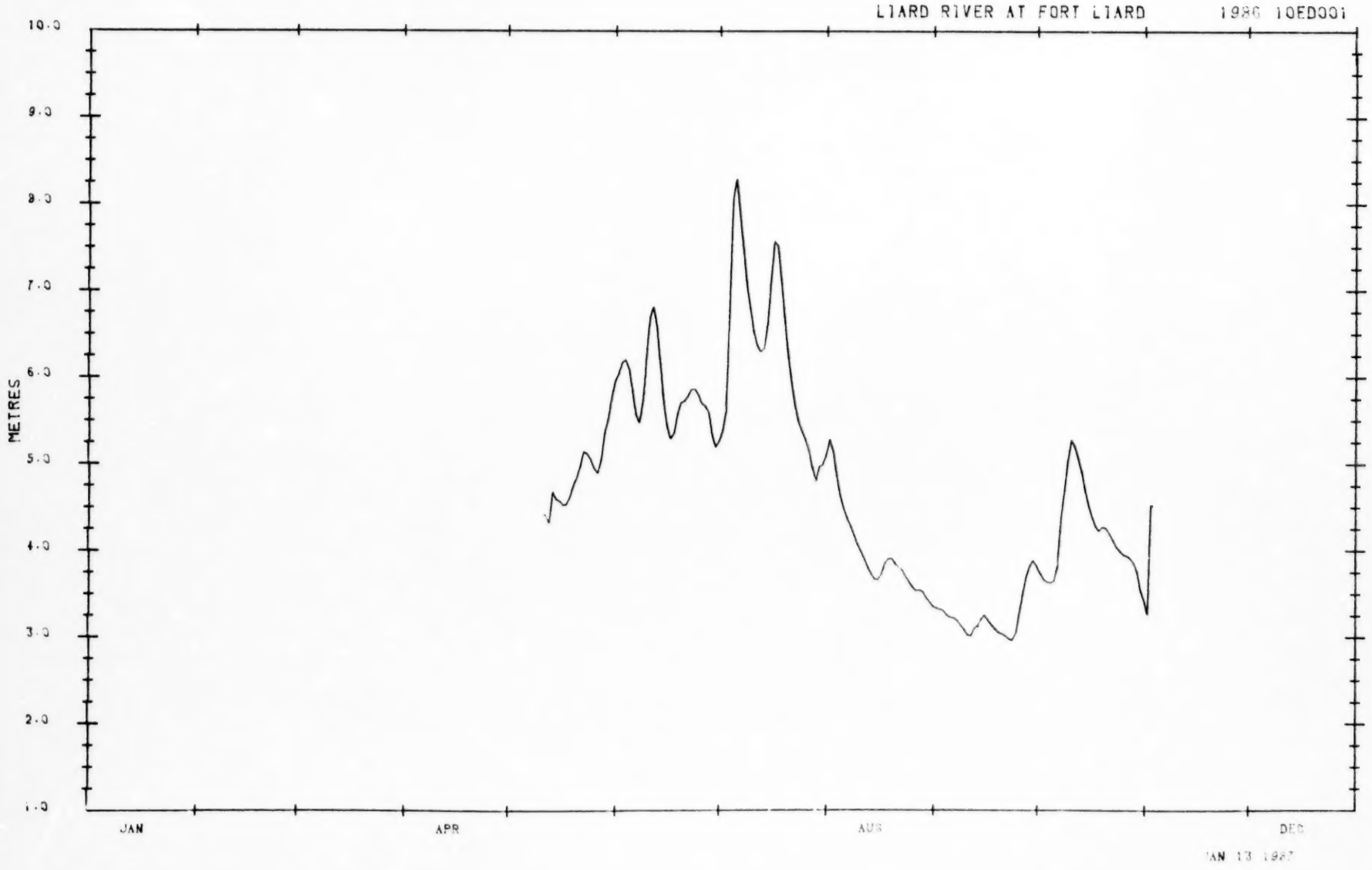
Table Number 1

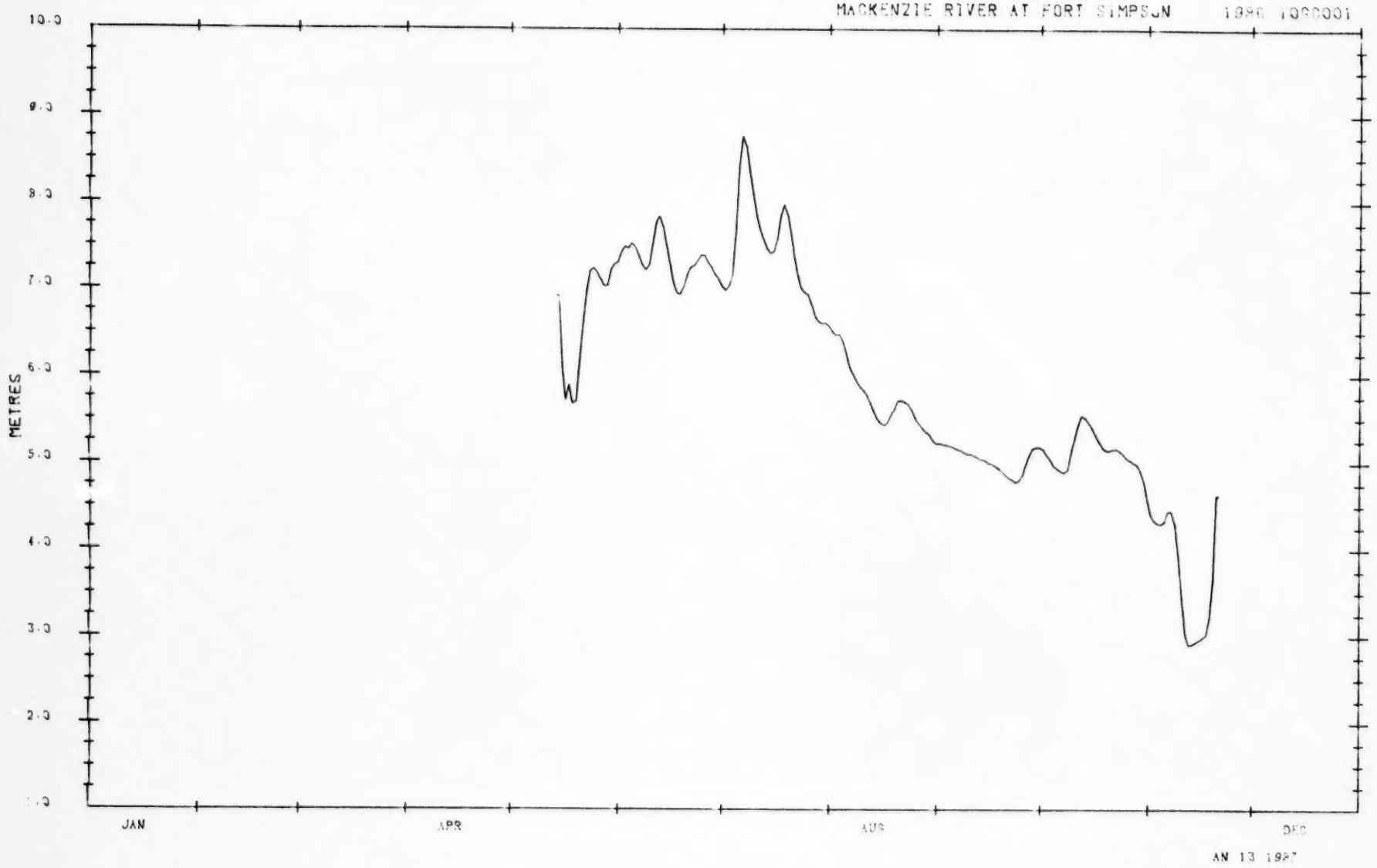
ITEM	COST	COST SHAREABLE	
		DOE	MOT
Pre-Season Workshop	638.00		
Athabasca-Mackenzie Waterways Workshop - Vancouver	1116.00		
Observer Service June to October	1752.00		
Travel & Expenses Fort Smith Inuvik/Norman Wells	20225.00		
Maintenance - Station Equipment	1712.00		
Communications Interrogating - DCPs Telex - Messages to Users Telephone - Observers	3431.00		
Forecast Report Printing and Distribution	326.00		
Total Operational Costs Total Salaries	29200.00 13378.00	14600.00 13378.00	14600.00
GRAND TOTAL	42578.00	27978.00	14600.00

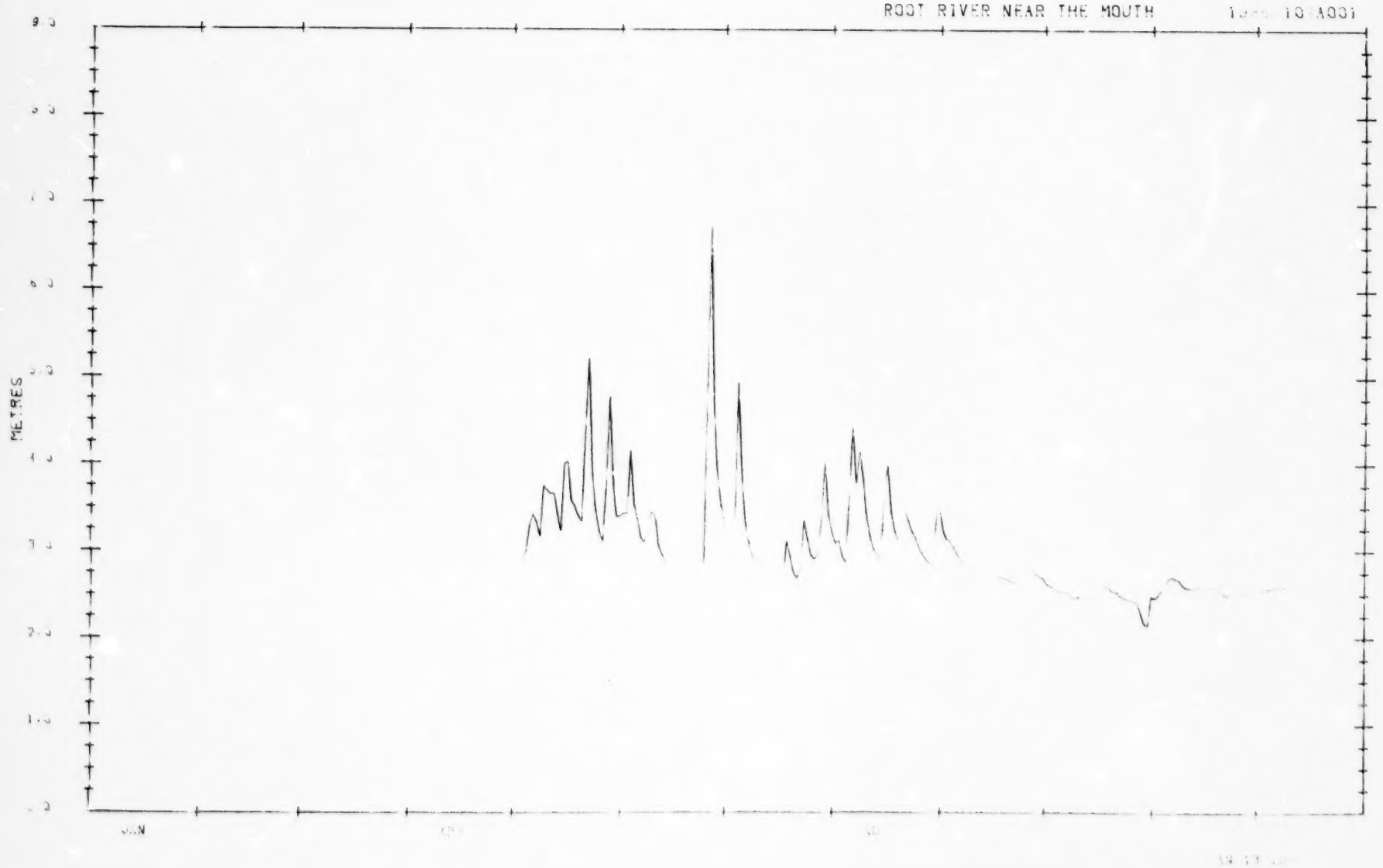

GREAT SLAVE LAKE AT YELLOWKNIFE BAY 1986 07SB001
158.5
158.0
157.5
157.0
156.5
156.0
155.5
155.0
154.5
154.0
METRES
JAN
APR
AUG
DEC
JAN 9 1987

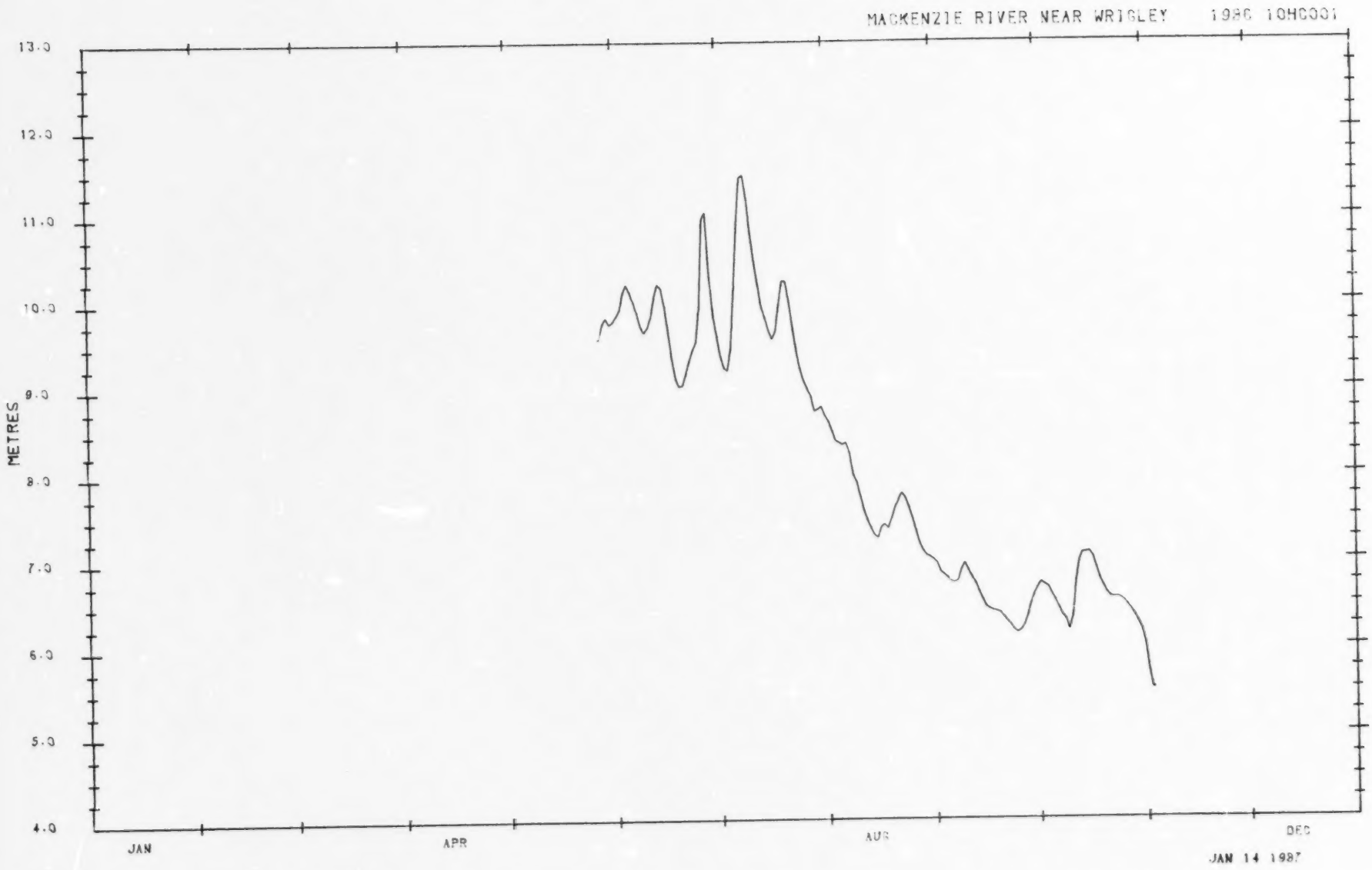

MACKENZIE RIVER NEAR FORT PROVIDENCE 1980 10FB001
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
METRES
JAN
APR
AUG
DEC
JAN 9 1987

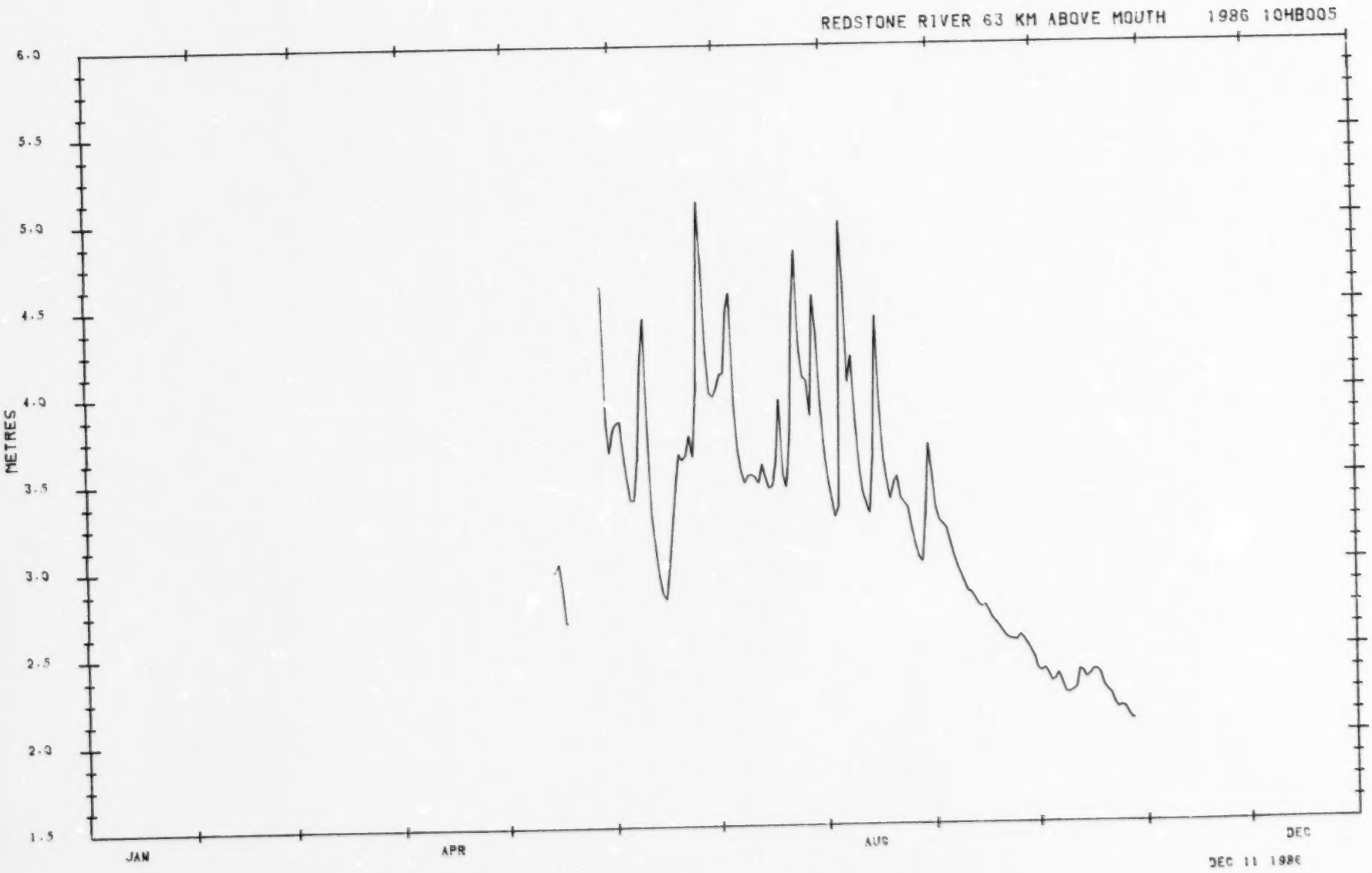

SOUTH NAHANNI RIVER ABOVE VIRGINIA FALLS 1986 10EB001
METRES
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
JAN
APR
AUG
DEC
JAN 13 1987

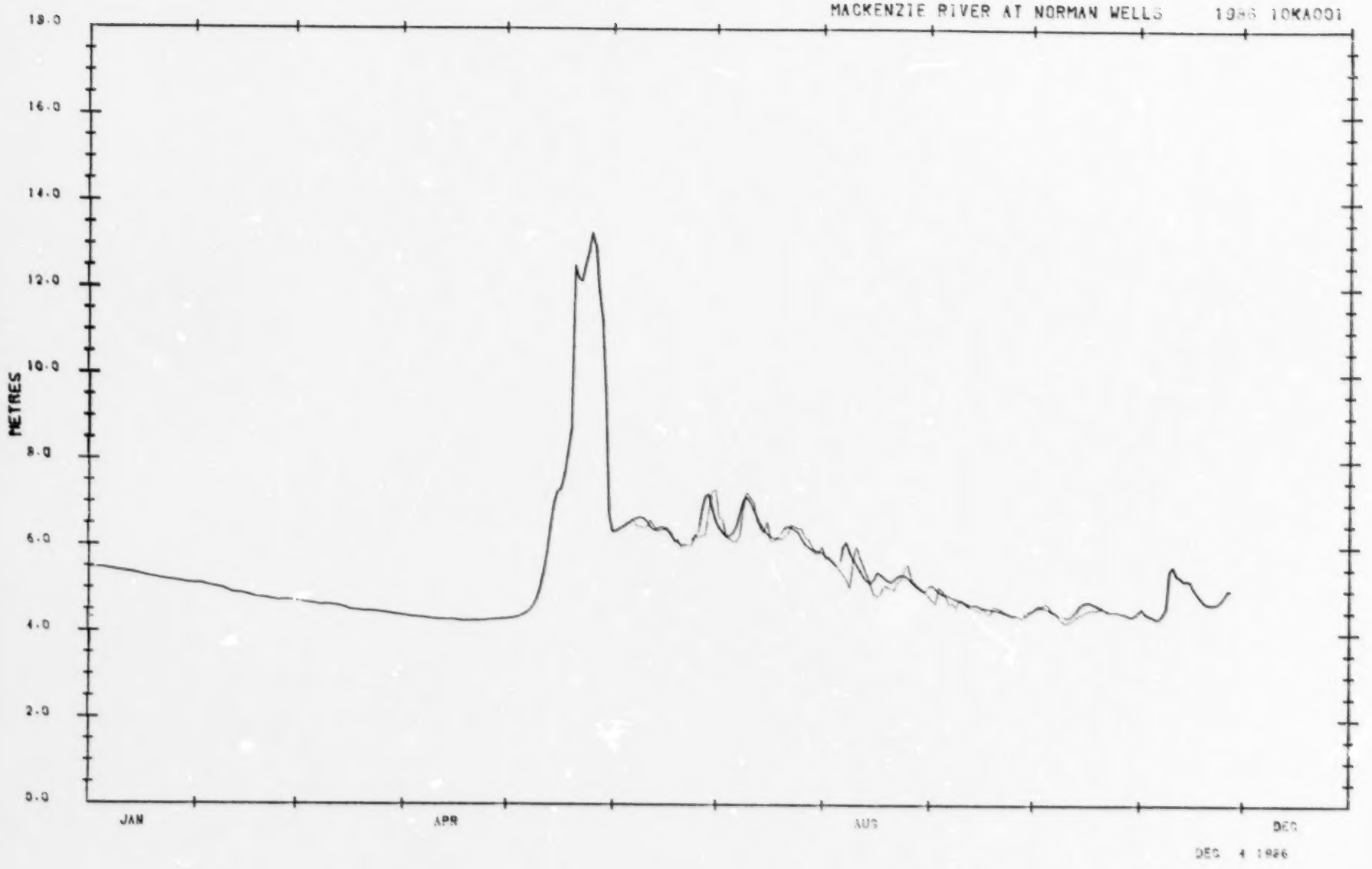

LIARD RIVER AT FORT LIARD 1986 10ED001
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
METRES
JAN
APR
AUG
DEC
JAN 13 1987

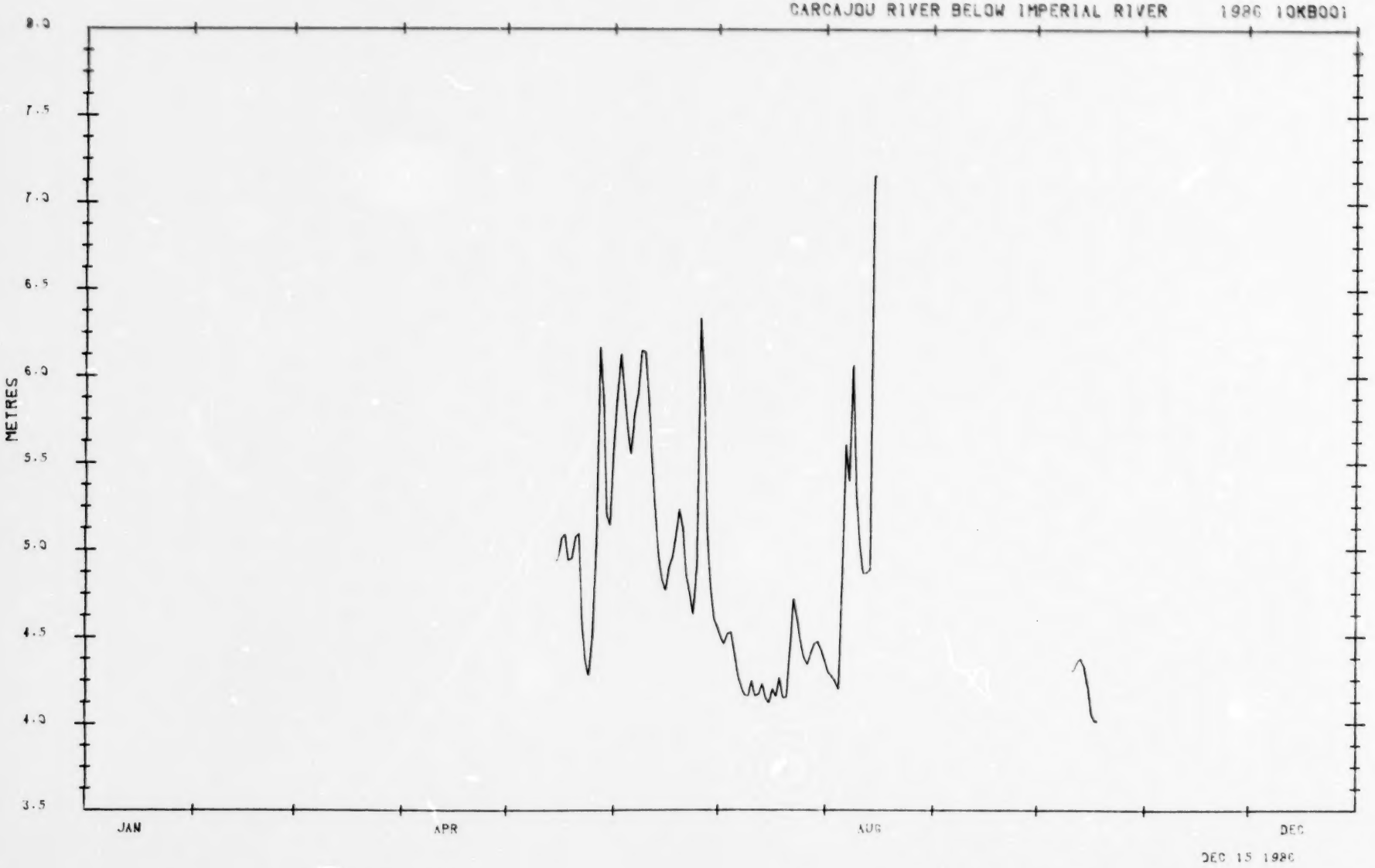

MACKENZIE RIVER AT FORT SIMPSON
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
METRES
JAN
APR
AUG
DEC
AN 13 1987

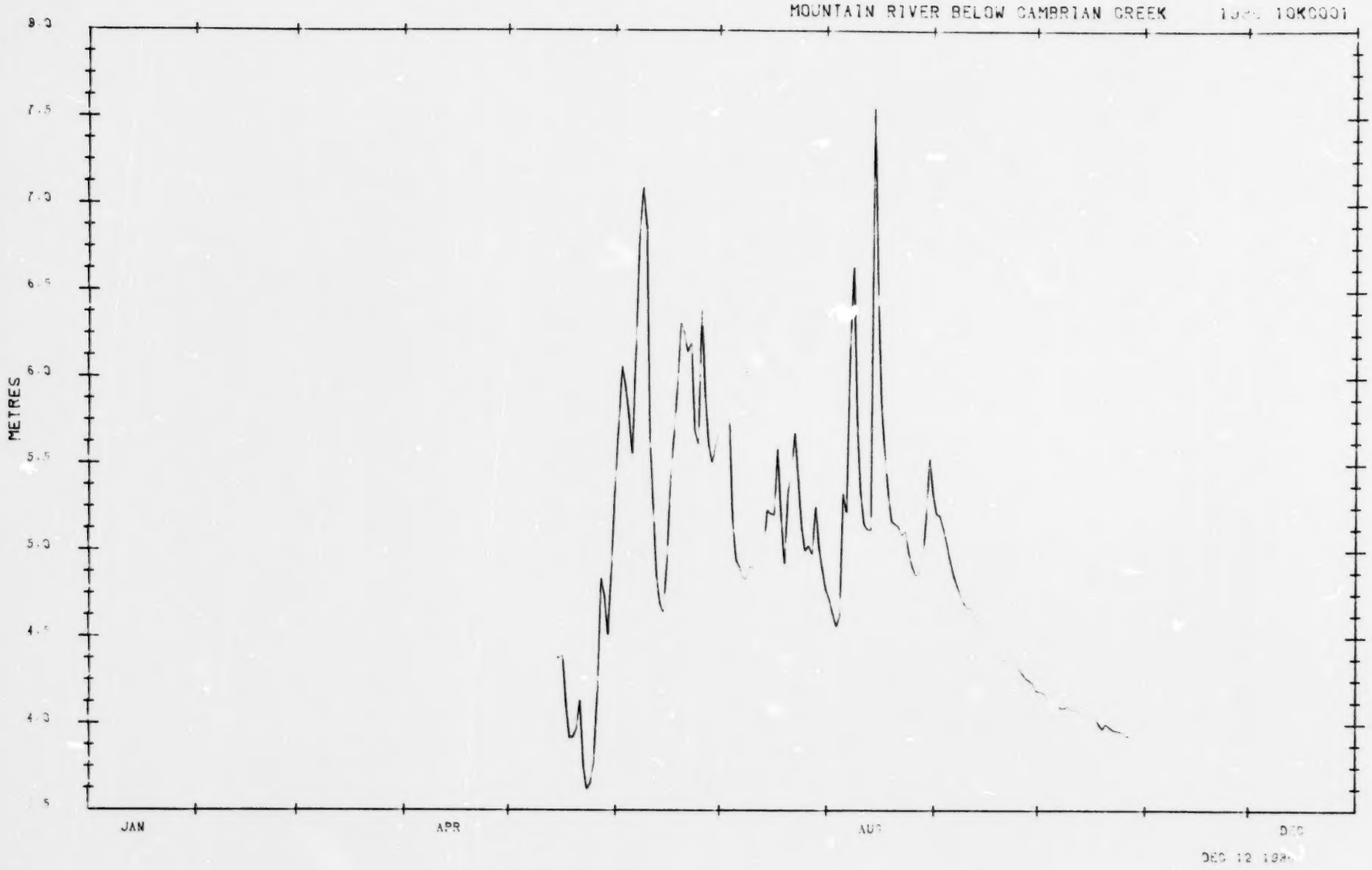

ROOT RIVER NEAR THE MOUTH
METRES

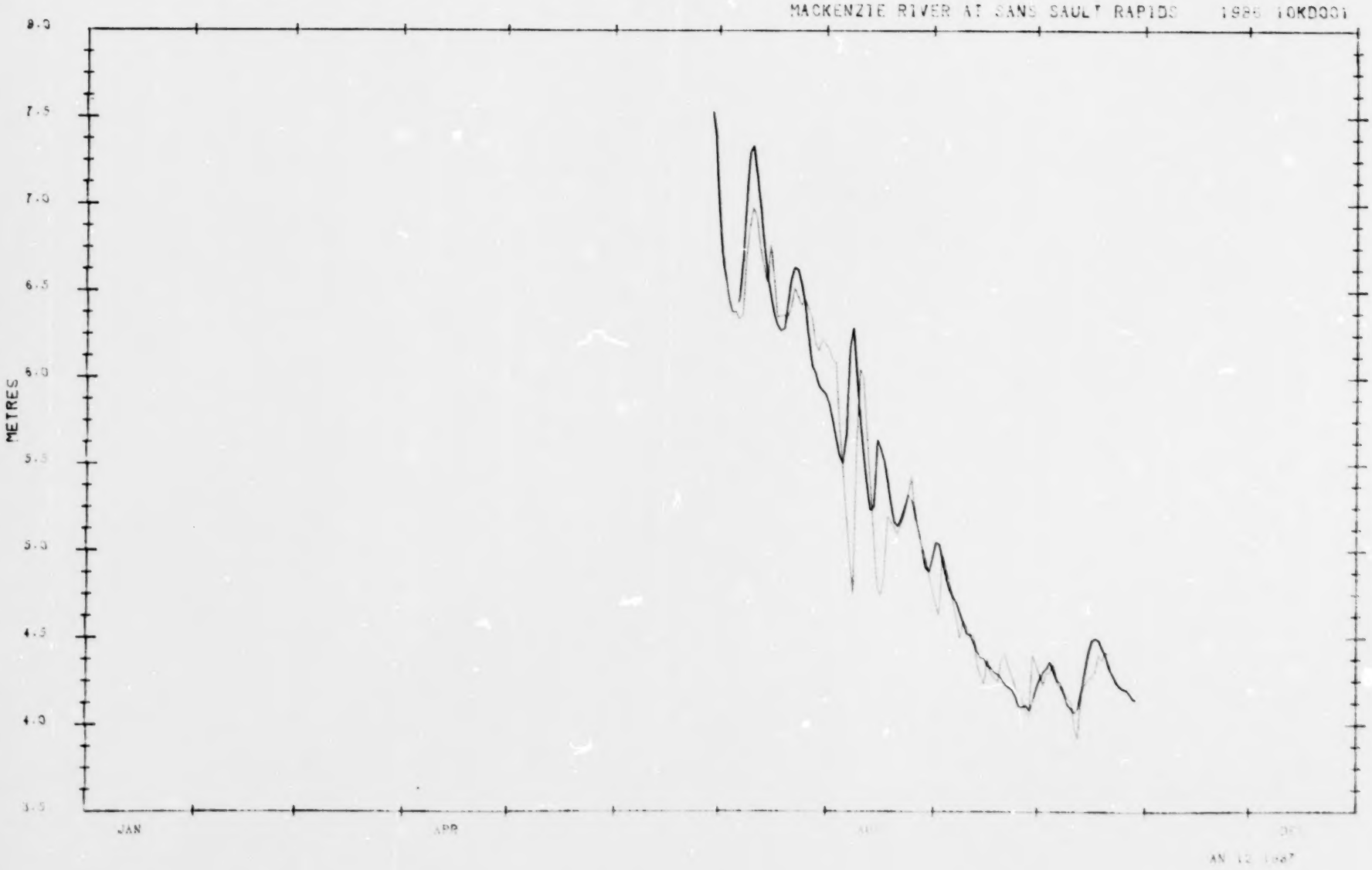

MACKENZIE RIVER NEAR WRIGLEY 1980 10HC001
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
METRES
JAN
APR
AUG
DEC
JAN 14 1987

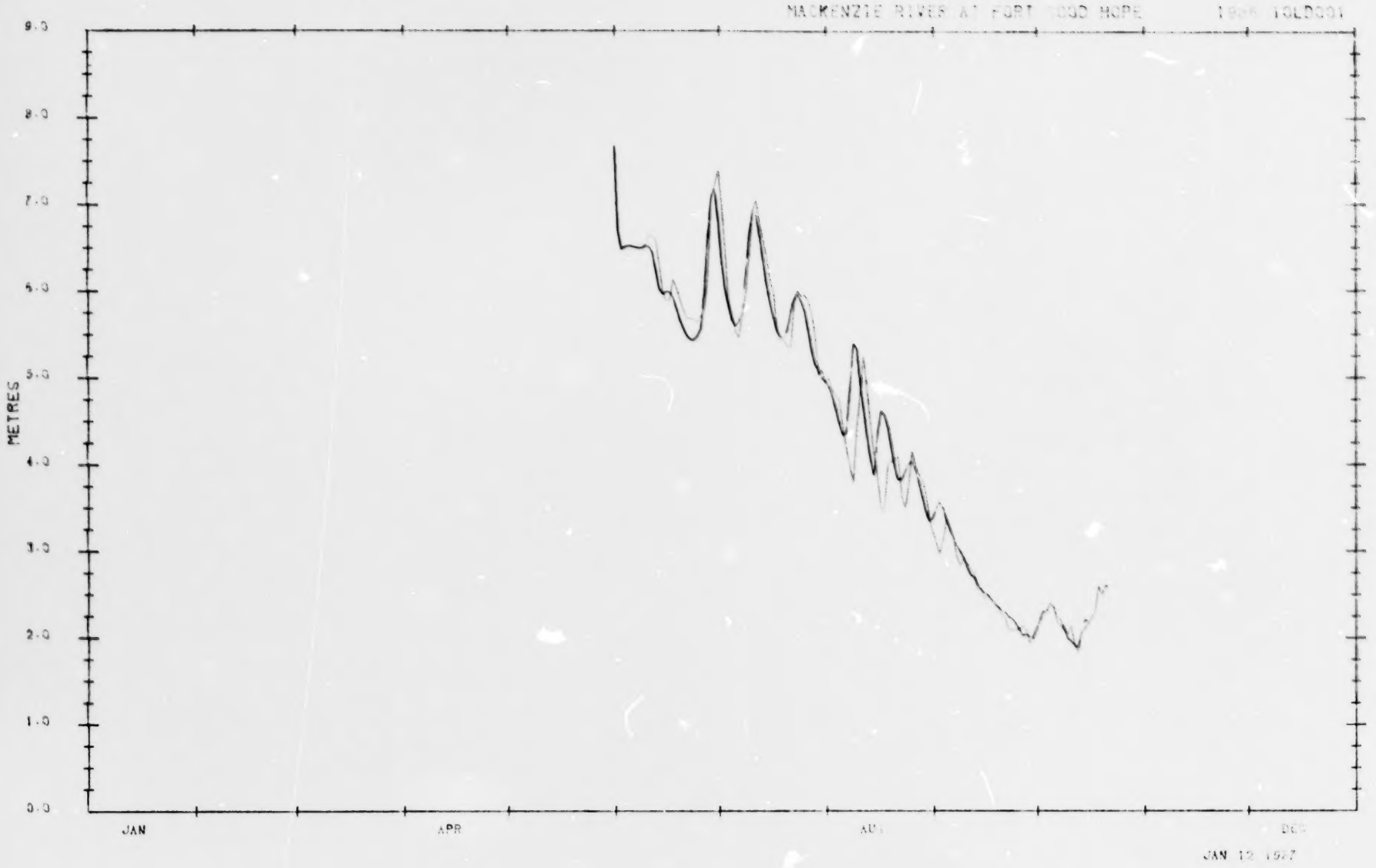

REDSTONE RIVER 63 KM ABOVE MOUTH 1986 10HB005
METRES
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
JAN
APR
AUG
DEC
DEC 11 1986


MACKENZIE RIVER AT NORMAN WELLS 1986 10KA001
METRES
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
JAN
APR
AUG
DEC
DEC 4 1986


CARCAJOU RIVER BELOW IMPERIAL RIVER 1986 10KB001
METRES
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
JAN
APR
AUG
DEC
DEC 15 1986


MOUNTAIN RIVER BELOW CAMBRIAN CREEK
METRES
JAN
APR
AUG
DEC 12


MACKENZIE RIVER AT SANS SAULT RAPIDS
METRES
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
JAN
APR


MACKENZIE RIVER AT FORT GOOD HOPE
METRES
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
JAN
APR
AUG
DEC
JAN 12 1977